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ADVANCED MOPPING MACHINE

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ABSTRACT

This study is mainly aimed over the different cleaning functions which can be performed by this Advanced Mopping Machine. It is a compact battery-operated automatic floor cleaning machine which can do brooming and mopping operation. Besides this, it can be used for floor sanitization. This machine consists of a 12V battery, one vacuum cleaner, two brushes, Arduino, Motor Shield, ultrasonic sensor, BO motors, one wiper etc. The basic working of the machine is performing the brooming and mopping with automatic motion of machine based upon the sonar mechanism.

At the front, there is an ultrasonic sensor with radial brushes combined with vacuum cleaner. At the end there is a wiper and water tank to perform the mopping over the floor.

1. INTRODUCTION

Cleaning is essential and necessary operation for a healthy life. In this busy time if this task can be performed by a machine, then this time can be saved and also labour and labour cost can be reduced. This manpower can be used in other areas to improve the productivity. This machine can be installed in hospitals, small- or large-scale industries, in houses, halls, platforms etc. Machine is easy to operate and can be used by anyone. It is one machine with multiple functions.

1.1 Objective

1) To make the machine automatic. Switch based turn on/off system.
2) To make the brooming and mopping operation efficient.
3) To build a more stable motion such that sensor can detect the obstacle as early as possible and take decision based upon that.

This machine can be used for cleaning of different types of floors such as tiles, wooden or cemented floors. Machine follows straight path motion with turning at a point.

1.2 Motion: when machine is turned on the ultrasonic sensor will emit the ultrasonic sound wave which will strike the object and will return and receive by the receiver. If there is no object in front of the sensor then machine will run in the straight path and if some object come in front of the sensor, then it will check for its left and right whichever will have the clearer path the machine will turn in that direction.

1.3 Cleaning of Tiles: In most of the houses, flats and industries tiles are very common and are more attractive and catchier to eye thus now a days they are frequently used. Cleaning of these tiles can be done in the following manner:
1. First turn on the brushes and vacuum cleaner which will clean the dust and dirt particles from the floor.
2. Now fill the water tank and position the wiper so that the mopping can be performed.
3. One spray with solution of cleaning agent or acidic solution can be used for the sanitization of floor.

Image of the working model over tile floor

This image was captured on 22/04/2022 during first exhibition of the machine in IMS Engineering College, Ghaziabad. Results from testing.

1) Machine can operate up to 12-15mins continuously.

2) Charging time was 2-2.5 hours.

3) It can detect the obstacle within the range of 20 cm.

4) It can do dry cleaning, wet cleaning or both. Now, machine can't detect the depth over the floor.

2. TARGETED PROBLEM

1) In this scenario of busy and tight life each and every second is valuable. With all this the daily cleaning is also needed for a healthy life.

2) For employed women it become really hard to manage both office work and house work.

3) It involves large time to clean the floor.

4) For large scale industries a great number of workers are required to do the cleaning task.

3. PROPOSED SOLUTION

1) An automated floor cleaning robot is a great solution to this problem.

2) These machines are programmed and they can do work on scheduled time.

3) They can operate over different types of floors.

4) Different operations like cleaning, vacuuming, soaking, mopping or drying all can be done by one machine.

4. LITERATURE REVIEW

In modern scenario the concept of automatic floor cleaning is essential and, in this time, a machine capable of performing cleaning tasks is in great demand. With the brief review of different paperwork and technologies used in different cleaning robots, we have started to work on the design of our Advanced Mopping Machine which operates on Arduino uno. Some papers of literature review are as follows:

Aishwarya Pardeshi et. al, [1] Study of this paper provides information to build a programmed cleaner robot. this is an automatic robot with features like choose and place mechanism and dirt container attached with air vacuum unit.

Abhishek Pandey et. al, [2] Provide information on 3aqsautomated cleaning robot for houses. It is human operated system which should be programmed for automation. They had also worked over some precise operation of the machine to help the physically disabled persons.

S Monika, K Aruna Manjusha et. Al [3] In this research paper we reviewed various method for efficient and neat floor cleaning. These cleaning robots save the cost and time of sweepers and increase the productivity. Few drawbacks that have been overcome during this project paper are:

1) Cleaning of the wet floor.
2) Capable of cleaning in small areas.
3) More stable motion of machine with fast detection of the obstacle in its front.

Amit Sharma, Akash Choudhary et. al [4] the objective of this project is to build a fully automated hybrid house cleaning robot capable of performing tasks like mopping and cleaning of floor. After testing on various parameters like path following, obstacle avoidance, navigation, mopping and vacuum operation. we found that it can perform all tasks fine with zero hurdle.

5. METHODOLOGY

Advanced Mopping Machine is a battery-operated automatic floor cleaning machine capable of performing cleaning and mopping functions simultaneously or alternatively based upon the requirements.

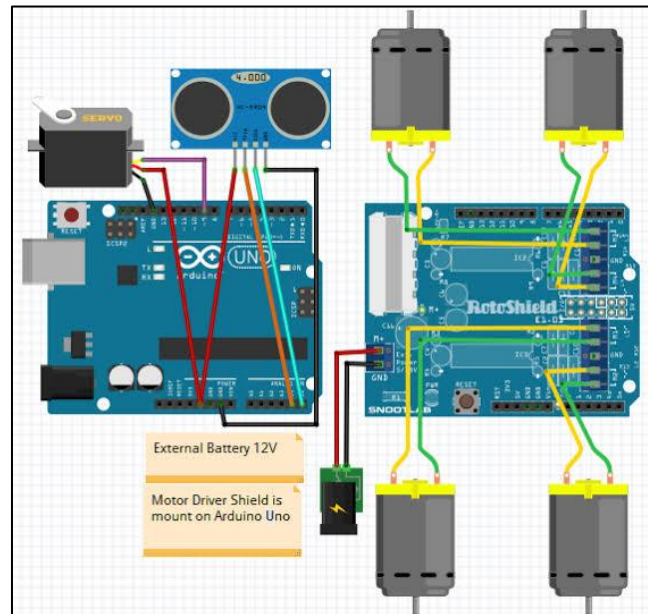**Layout of Advanced Mopping Machine**

Advanced Mopping Machine
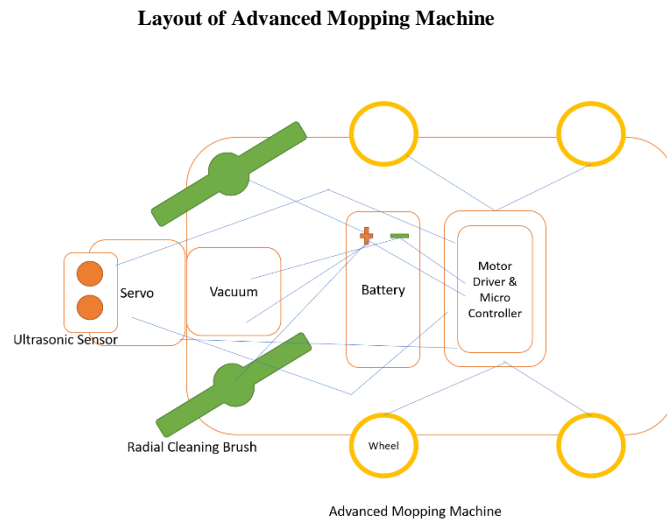
It is rectangular in shape with ultrasonic sensor at its front side and wiper at the end. Two brushes are at the bottom of machine in its front side with vacuum mechanism to suck the dirt. Dust chamber is attached with the vacuum cleaner which can be detached.

Entire machine operates over Arduino Uno. The program is fetched into Arduino processor which controls and operates the other units. L293D is the motor shield or motor driver which controls all the motors in the circuit. When any object come in front of ultrasonic sensor the instructions are being transferred between Arduino and sensor. Based upon the condition which is true, further set of instructions executes.

To build this Advanced Mopping Machine follow the procedure given below:

1) Use a plyboard to make the base and body of the machine.
2) Attache 4 DC motors with wheels to the base.
3) Build the vacuum cleaner, two brushes and a wiper, and attach them to the body of the machine.
4) Now attach the Arduino with motor shield(L293D), ultrasonic sensor and a servo motor

After assembling all the units, do the connection. You can do the connections as provided in the image below:

Circuit Diagram [5]

5) Now write the program in the Arduino for the motion.

6) After finishing these steps now, use a 12V rechargeable battery to power up the system.

The essential Components which are used to build the Advanced Mopping Machine are Arduino Uno, L293D Motor Shield, Ultrasonic Sensor, Servo Motor, Vacuum Cleaner, Wheels, Brushes, 12V rechargeable battery, wiper and water tank etc.

Servo Motor: It is a rotary or linear actuator used for precise control of angular or linear position, velocity and acceleration. It uses closed-loop feedback control system.


In this machine we have used the servo motor to provide precise and controlled motion to the ultrasonic sensor.

Arduino: Arduino uno is one of the types of printed circuit board. It's an open-source platform which is freely available to use.
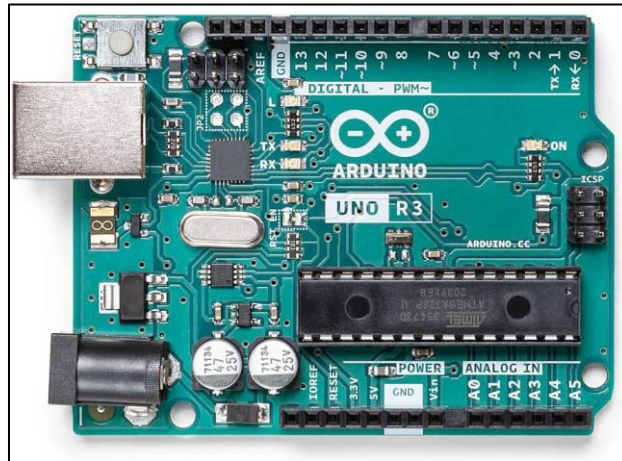
It has ATmega328p microchip with 14 digital I/O pins (6 PWM pins), 16MHz quartz crystal, one USB port, reset button. Company named it uno which means one in Italian language. This PCB is open-source platform so, consist of several demo program thus, it is used for developing various electrical and mechanical systems.

L293D Motor Shield: L293D is a dual channel H-bridge motor shield which can drive 4 bi-directional dc motor with 8-bit speed selection (0-255), 2 stepper motors (unipolar or bipolar) and 2 servo motors. It has 2 L293D motor chipset.
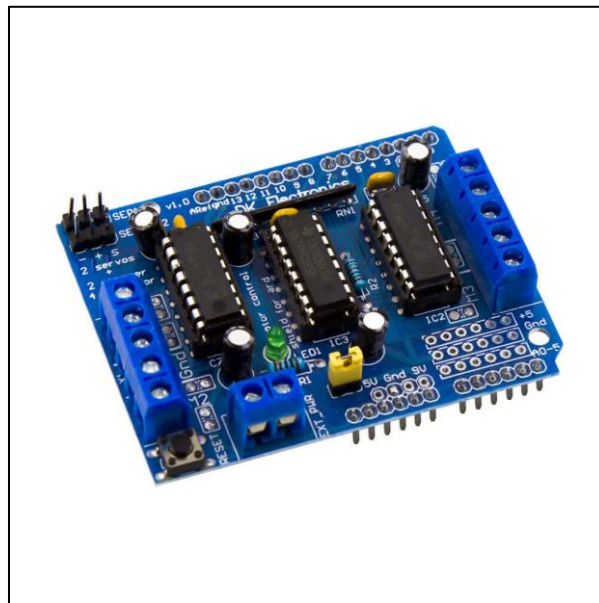
Ultrasonic Sensor: hc-sr04 is the ultrasonic sensor used to measure the distance from objects without any contact by transmission of ultrasonic sound waves and uses the sonar mechanism. It's working range is from 2cm to 400cm with the accuracy ranging up to 3mm. It has four pins VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).
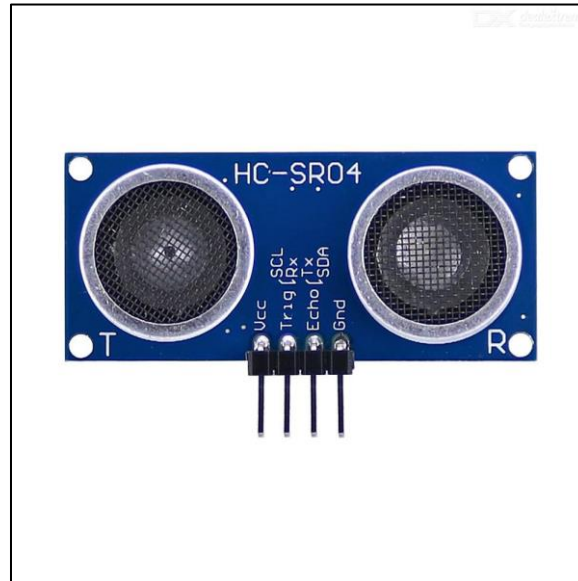
6.   CONCLUSION

Advanced Mopping Machine (AMM) is a low-cost fully automated floor cleaning robot. Our AMM can do the cleaning and mopping work over the tiles floor efficiently. Our aim is to provide this machine to each and every house and industries for cleaning purposes thus, bringing a change in this area of traditional cleaning.

REFERENCE

[1]   P. Aishwarya, S. More, D. Kadam, V.A. Patil, "Automatic Floor Cleaner", IJECT vol. 8, 2017.

[2]   A. Pandey, A. Kaushik, A. K. Jha, G. Kapse, "A Technological Survey on Autonomous Home Cleaning Robots", International Journal of Scientific and Research Publications, vol. 4, no. 4, 2014.

[3]   S Monika, K Aruna Manjusha, S V S Prasad, B.Naresh "Design and Implementation of Smart Floor Cleaning Robot using Android App" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-4S2 March, 2019.

[4]   S. Amit, A. Choudhary, A. Gaur, and A. Rajpurohit, "Fully automated hybrid home cleaning." International Journal of Engineering Technologies and Management Research, vol5, no. 3, pp. 219-225, 2018.

[5]   Circuit Diagram, image is downloaded from the website "Microcontrollers Lab", Website URL "microcontrollerslab.com" for the purpose of education.